

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re:	Patent Application of Wei SUN, <i>et al.</i>	: Group Art Unit: 1649 : :
Appln. No:	10/540,968	: Examiner: Hugh M. Jones : :
Filed:	September 26, 2005	: Attorney Docket No.: : 046528-5047 (415078) :
For:	METHODS AND APPARATUS FOR COMPUTER-AIDED TISSUE ENGINEERING FOR MODELING, DESIGN AND FREEFORM FABRICATION OF TISSUE SCAFFOLDS, CONSTRUCTS, AND DEVICES	: : : : : : :

**Declaration of WEI SUN, Ph.D., Under 37 C.F.R. § 1.131**

1. I, Wei Sun, am a named co-inventor of the present application, U.S. App. Ser. No. 10/540,968.
2. I am a Professor of Mechanical Engineering and Biomedical Engineering at Drexel University.
3. The present application, U.S. App. Ser. No. 10/540,968, is a national stage entry application of PCT/US04/15316, filed May 14, 2004, which claims priority to U.S. Provisional App. No. 60/520,272, filed November 14, 2003.
4. This Declaration is offered as proof to establish that the subject matter of the invention of presently presented claims 1 and 10 was invented prior to February 22, 2003.
5. I am the sole inventor of at least claims 1 and 10 as presently presented.

6. Attached hereto as Exhibit A is an unpublished, draft manuscript which I created prior to February 22, 2003.

7. Attached hereto as Exhibit B are unpublished depictions of the claimed apparatus which I created prior to February 22, 2003.

8. I invented the apparatus of claim 10, as well as the process of claim 1 that the apparatus of claim 10 performs, prior to February 22, 2003, as evidenced by the subject matter described and illustrated in both the unpublished, draft manuscript I created (Exhibit A) and the depictions of the apparatus I created (Exhibit B) prior to February 22, 2003.

9. The unpublished manuscript of Exhibit A describes the process for construction of heterogeneous CAD modeling based composite unit cells. As explained in the unpublished manuscript of Exhibit A, the constructed unit cell is a multi-volume based CAD model with material heterogeneity assigned as a design attribute in the volume. Modified Boolean operation with reasoning merging and extracting is developed to execute the object manipulation between different materials (volumes). The heterogeneous unit cell model is capable of capturing the designed geometrical configuration and reinforcement orientation at the individual constituent phases, as well as retaining the distinctive reinforcement and matrix material properties. In addition, the developed unit cell model is also intended for implementation with available CAD/CAE/CAM systems for integrated design, simulation, and manufacturing of advanced composites.

10. The unpublished depictions of Exhibit B illustrate various designs of a multi-nozzle biopolymer deposition apparatus for implementing the processes described in the unpublished manuscript of Exhibit A. The various depicted apparatuses of Exhibit B are of a multi-nozzle printer for processing the desired scaffold model and converting it into a layered process tool path, as well as to simultaneously deposit materials to construct the scaffold. The apparatuses as depicted in Exhibit B are embodiments of the machinery for carrying out the process steps described in Exhibit A.

11. It is my understanding that at least pending claims 1 and 10 of the present application read on the subject matter and apparatus as depicted in Exhibits A and B, as well as the processes the apparatus depicted in Exhibits A and B performs.

12. It is my understanding that the earliest date for which U.S. Pat. No. 7,051,654 (hereinafter '654) can be considered as a prior art reference is May 30, 2003.

13. Regardless of what the '654 patent allegedly discloses, I invented the claimed features of the apparatus and processes performed by the apparatus of presently presented claims 1 and 10 prior to February 22, 2003, as evidenced by attached Exhibits A and B and by my statements linking Exhibits A and B together, as provided in this Declaration. It is my understanding that the earliest filing date available for the '654 patent to qualify as a prior art reference occurs after February 22, 2003. Therefore, I invented the claimed features of the apparatus of presently presented claims 1 and 10 prior to whatever is disclosed and described in the '654 patent.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

July 19, 2011

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(date)



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Wei Sun, Ph.D.